MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The REVIEW for September, 1896, is based on 2,746 reports from stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,421 from voluntary observers; 33 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 14 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

During the current month the average pressure was slightly above normal on the northern and eastern slope of the Rocky Mountains, as also in Nova Scotia, Newfoundland, and Bermuda. The temperature was slightly above normal in the South Atlantic and Gulf States and southern Plateau Region. The mean temperature was the lowest on record at Rapid City, Sioux City, and La Crosse. The precipitation was decidedly above normal in the Ohio Valley, Illinois, on Lake Michigan, the Lower Lakes, and the coasts of New England and Nova Scotia. Considerable snow was reported from Montana and Colorado. The principal storms of the month were the two hurricanes that passed northward along the Atlantic Coast on the 5–10th and 28–30th. Hot, dry weather has injuriously affected the crops in a few States.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high on the Atlantic Coast and in northwestern Washington and low in Arizona.

The highest pressures were: Bermuda, 30.12; Halifax, 30.09; Lynchburg, 30.08; Charleston and Parkersburg, 30.07. The lowest were: Yuma, 29.76; Phœnix, 29.80; Fresno, 29.34.

As compared with the normal for September, the mean pressure was in excess in the upper Mississippi and Missouri valleys, as also in Bermuda, Nova Scotia, and Newfoundland. It was deficient in California and the Gulf and Atlantic States. The greatest excesses were: Edmonton, 0.13; Miles City, 0.10; Calgary and Helena, 0.09. The greatest deficits were: Roseburg, Sacramento, Baltimore, Harrisburg, and Nantucket, 0.06.

As compared with the preceding month of August, the pressures, reduced to sea level, show a rise over the northern and eastern Rocky Mountain Slope, the Lake Region, and New England, but a fall in the South Atlantic and Gulf States and on the Pacific Coast. The greatest rises were: Calgary, 0.09; Helena, Havre, and Battleford, 0.08. The greatest falls were: Jupiter, 0.11; Key West, 0.10; Tampa and San Diego, 0.09; Galveston and Eureka, 0.08.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month seven high and eleven low areas have had sufficiently well defined trajectories to be charted. Their paths will be found on Charts I and II, together with the pressure at the position of center twice each day. The accompanying table gives the place of origin and also of disappearance, the length and duration of the path, and the velocity of each high and low pressure area. The high areas took a much more southerly average path than in August, while most of the low areas were just on the northern border of the region of observation. Three of the highs originated to the north of Montana and the other four off the north Pacific Coast. One of the highs finally merged with a rather permanent high in the Gulf Region, a second was last seen off the middle Atlantic Coast, and the remaining five disappeared off Nova Scotia.

Of the lows Nos. II, III, VII, VIII, IX, and X started to the north of Montana and moved nearly due east; No. I began in Montana and moved east; No. V began in South Dakota and moved a little south of east; No. VI was first noted northwest of Lake Superior and moved east.

No. IV was a well developed West India hurricane which,

however, only touched the country on the southeast point of New England. One of the ocean steamers that was caught in this storm has forwarded a barograph sheet showing the central depression on the 6th, when a reading of 28.50 inches was reached. This sheet is reproduced on a later page. On the morning of the 5th a report was received from Nassau, Bahama Islands, stating that a disturbance was forming near there. Its path was just half way between Bermuda and North Carolina. No effects from this storm were felt on the Atlantic Coast till the afternoon of the 7th when the observer at Hatteras hoisted his northeast signal. On the morning of the 8th the wind reached 34 miles at Hatteras, and at night the maximum wind was 36 miles at that station. At 9.30 p. m. of the 8th storm northeast signals were hoisted from New York City along the southern New England coast. By 1 p. m. of the 9th the storm had advanced sufficiently to warrant hurricane signals from Montauk Point, Long Island, to Portland, Me. During the afternoon of the 9th a maximum wind of 76 miles was reached at Block Island, which was the highest reported at any land station. On the a. m. of the 10th the storm had lost some energy, and by night it was almost entirely replaced by a high area over Nova Scotia.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Duration.	Length.	Daily.	Hourly.
High areas.		°	°		°	°	*Days.*	*Miles.*	*Miles.*	*Miles.*
I*										
II	2, a. m.	54	108	6, a. m.	46	59	2,700	4.0	675	28.1
III	3, a. m.	49	124	10, a. m.	44	59	3,760	7.0	536	22.3
IV	7, p. m.	50	126	14, a. m.	47	62	3,880	6.5	596	24.8
V	12, p. m.	54	113	16, a. m.	47	72	1,940	3.5	554	23.1
VI	15, p. m.	44	124	21, a. m.	36	78	3,600	5.5	655	27.3
VII	20, a. m.	54	110	26, a. m.	48	55	4,100	6.0	683	28.5
VIII	24, a. m.	45	125	30, p. m.	30	89	2,930	6.5	449	18.7
Sums							22,900	39.0	4,148	
Mean of 7 paths									593	24.7
Mean of 39 days									587	24.5
Low areas.										
I	1, a. m.	47	106	4, a. m.	47	60	2,270	3.0	757	31.5
II	3, a. m.	51	113	7, a. m.	50	69	2,100	4.0	525	21.9
III	5, a. m.	53	118	9, p. m.	36	102	1,940	4.5	432	18.0
IV	5, a. m.	26	78	10, a. m.	42	71	1,270	5.0	254	10.6
V	13, p. m.	43	98	16, a. m.	37	74	2,020	2.5	808	33.7
VI	16, p. m.	50	91	19, a. m.	49	53	1,820	2.5	730	30.4
VII	17, p. m.	53	104	20, a. m.	47	57	2,150	2.5	859	35.8
VIII	19, p. m.	54	110	23, a. m.	46	58	3,130	4.0	782	32.6
IX	22, a. m.	54	115	26, p. m.	49	71	2,430	4.5	540	22.5
X	26, p. m.	55	111	29, a. m.	52	98	980	2.5	392	16.3
XI	26, p. m.	23	84	30, p. m.	48	80	2,210	4.0	552	23.0
Sums							22,320	39.0	6,631	
Mean of 11 paths									603	25.1
Mean of 39 days									572	23.8

*No. VI of August; noted for thirty-six hours only.

The most notable storm of the month was reported near the northwest edge of Cuba p. m. of 26th. An area of high pressure remained nearly stationary off the middle Atlantic Coast for two days and this prevented a rapid development of the storm. By a. m. of 28th the wind had shifted to southeast at Key West, showing that the storm had moved to the southwest coast of Florida. By a. m. of the 29th it had moved to southeast Georgia, increasing rapidly in intensity. By 8 p. m. of the 29th the storm had moved with great rapidity and was central over Lynchburg, Va., which station reported a barometer reading of 29.30 inches. About three hours later occurred the severest storm or "wind-rush" ever experienced in Washington, D. C., a description of which will be found elsewhere. On the a. m. of the 30th the storm had moved to Lower Michigan. Storm and hurricane signals were ordered along the Atlantic Coast in ample time, thus detaining in the harbors along the coast sailing and steam vessels valued in the aggregate at over $7,000,000, some of which might have been lost but for the warning. On board these vessels there were about 1,750 sailors and passengers. A full description of the damage wrought by the storm in Florida and along the south Atlantic Coast will be found under severe storms.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The noteworthy features of the month were the severe thunderstorms of the 17th in eastern Pennsylvania and New Jersey, the high easterly winds over northeastern Utah on the night of the 18th, and the very severe West India hurricane of the 29–30th.

Three small tornadoes occurred during the month. No lives were lost and the total loss of property was quite small. The details are given below:

4th.—A severe local storm was reported as having destroyed farm property near Caldwell, Kans. An incipient tornado passed through the suburbs of Yorkville, S. C., at 5 p. m., eastern time; no casualties; property loss about $1,500; path half-mile wide and about 2 miles long; moved to the west. A severe thunderstorm swept over Baltimore and vicinity. Two lives were lost by the capsizing of small boats. The damage to dwellings and other property amounted to about $3,000. A destructive hailstorm passed over Weir City, Kans., at 7 p. m. Press dispatches state that glass valued at $10,000 was broken. Hailstorms were also reported in Missouri on the same date.

5th.—A tornado passed over the small hamlet of Waltersburg, Pa., about 7 p. m., eastern time; 4 persons were injured; property loss about $12,000; path 1,500 feet wide, and from 8 to 10 miles long; moved northeast.

10th.—Violent easterly gales prevailed on the New England coast, and as far south as New Jersey; small craft were wrecked at various points and considerable damage was done to property on the beaches.

16th.—A small tornado passed through the eastern part of Lucas and into Monroe Co., Iowa, on the 16th; further particulars are awaited.

17th.—Violent thunder and hailstorms prevailed throughout eastern Pennsylvania and New Jersey. The property loss was quite heavy, probably not less than $50,000.

18th.—On the evening of the 18th the pressure distribution over the Rocky Mountain Plateau was such as to cause high winds, in some cases attaining the velocity of a gale, over the greater part of northeastern Utah. In Cache, Weber, and Davis counties houses were unroofed, plate glass windows blown in, shade trees, signs, and awnings demolished, and orchards badly damaged. The damage in these three counties, at a conservative estimate, was not less than $75,000. At Ogden, where the wind was particularly severe, there was no rain; in other portions of the area covered by the high winds the rain was light.

19th. Severe local thunderstorms occurred throughout the eastern portion of the Middle Atlantic States on the evening of the 19th.

29–30th.—One of the severest West India hurricanes ever experienced struck the Florida coast at Cedar Keys about 3.30 a. m., September 29. It passed thence to Lake Ontario and the St. Lawrence Valley in twenty-four hours at a rather uniform rate of about 46 miles per hour. As is usual in storms of this class the path of relatively great destruction was quite narrow, not extending over 50 miles at any part of its course.

The storm pursued a northeasterly direction through Florida and Georgia. When near Savannah it seemed to curve slightly to the northward, passing thence almost due north to the St. Lawrence Valley.